FURTHER NOTES ON THE BRAIN OF THE SAUROPSIDA.

By E. C. Spitzka, M. D.

1. A most notable feature of the cerebral hemispheres of such reptiles as the Alligator, Iguana and sea-turtle is the absence of a proper choroid plexus in the lateral ventricle. This is the more remarkable as in the amphibia, the choriod plexus is very well developed. The sea-turtle has a few vascular coils protruding into the lateral ventricle at its posterior portion; nothing of the kind can be identified in the Iguana or in birds.

2. On removing the inner cerebral wall of an Alligator's hemisphere it can be seen that the Corpus Striatum is continued into the pedicle of the olfactory bulb, as a distinct prominence. In fact the substance of the pedicle is in the main a continuation of the Corpus Striatum and of the basilar part of the hemisphere, the dorso-lateral cortex becoming attenuated to a mere film on entering that structure. The lumen of the pedicle is a continuation of that recess of the lateral ventricle which undermines the mesal side of the root of the Corpus Striatum.

3. The Corpus Striatum is relatively more massive in the Sauropsida, than in any other animal group. It reaches its maximum in birds, where also the lateral ventricle is most reduced. It seems as if a secondary fusion must occur, as explaining the apparent obliteration noted in the latter group.

4. A careful study of the structure designated as the anterior commissure of the reptile's brain has failed to convince me that this structure is to be considered as the homologue of the same commissure in the mammalian brain. So far I am inclined to consider it as representing the Corpus Callosum, at least in part. Its fibres are medullated.

5. The inner face of the hemispheric wall is finely striated; this is due to the fasciculation of the nerve fibres lying subjacent to the ventricle; they correspond to the Corona radiata.

6. It is not difficult to see that the greater part of the cerebral surface, that is, the entire basilar and more than half of its lateral aspect is the representative of what in the mammalia is the least voluminous and functionally the least important portion, namely of the Island of Reil and the præperforate region. In some reptiles (Chelydra, Boa) these two districts or their homologues are demarcated from each other by a shallow sulcus. The area homologous with the Island of Reil, corresponds pretty accurately to the base of the Corpus Striatum; the other, represented in mammals by the *Substantia perforata anterior* is a bodily continuation of the thalamic halves, a marked constriction separates them from the thalami proper, on the dorsal surface. Perhaps they constitute a species of prothalamus.

There remains then as the representative of the convoluted portion of the cerebral hemispheres of the placental mammalia, merely the delicate thin walled portion of the reptilian cerebrum. It is here where the pyramidal nerve cells are found in the best development. In the tenuity of the subjacent nerve layer, it closely resembles the hemispheric wall of the mammalian embryo.

7. There are two varieties of cerebelli found in the Sauropsida; to these might be added a third or fundamental type from which the other or divergent types may be derived.

The fundamental type is found in serpents and apodal lacertians, as well as in Chelonia of a low type (Boa, Bascanion, Pseudopus, Chelydra). Here the cerebellum is a mere lip covering the entrance to the mesencephalic ventricle, as in the Amphibia, and in embryos.

The second type is found in the higher Chelonia (Cistudo, Naunemys, Calemys, Thalassochelys) and the Crocodilia (Alligator). Here the lip has become inflated, and extends like a hollow hood directly backwards over the fourth ventricle. It corresponds in its best development to nothing so much as to a baseball cap. This resemblance is heightened by the presence in the Alligator and Thallassochelys of a distant rim. I have found, in an individual of Cistudo, the Cerebellar cap dented from above, and turned inside out, as it were; the individual had suffered prolonged starvation.

The third variety is found in lacertians (Iguana) and birds (Struthio, Aro, Trichoglossus, Gallus, Columba, Phœnicopterus, etc). Here the cerebellar lip creeps up, as it were, on the posterior declivity of the optic (and post optic) lobes, firmly tied down to these by the arachnoid. In birds the lip becomes reflected from the highest point, and descends backwards.

The highest form of the second variety is found in the Alligator, where in the adult and in larger specimens, though not in the one or two-year-olds, there are distinct transverse sulci. In the sea-turtle an indication of transverse sulci is observed in hardened specimens; they may be artifacts, however.

8. An important feature of the reptilian brain are the lateral eminences of the Oblongata, which, from their connection with the eighth pair of cranial nerves, merit the designation of *eminentiæ acusticæ*. A reliquary fragment in the mammalia constitutes the Fasciola cinerea. But the greater portion of this, in reptiles (Alligator, Iguana) exceedingly complicated body seems to be a sort of herald of a higher cerebellar development, and the very similar lateral bodies of the human embryonic Oblongata appear to be swallowed up in the cerebellar mass. Future research must determine whether the *nuclei dentati* are derivable from these masses or whether some of the lesser cerebellar lobules monopolize them. In the Alligator they closely simulate cerebellar *folia*, and consist of gray and white substance. It is from them that arises the *eminentia transversa ventriculi quarti* so well developed in the Iguana and Alligator. In the latter the acoustic convolvuli are in morphological connection with the lateral kink of the cerebellum.

9. On comparing a series of animals beginning with the Amphibia, passing thence to the Sauropsida and ending with the mammalia, we find that there is this close correspondence to a series of mammalian embryonic and fœtal brains, that while in the lowest types the nerve fibres of the spinal cord are well provided with *myelin*, and the Oblongata presents the same maturity of structure, that it is only in higher types that the Cerebellum and Mesencephalon show the same or an approximate histological advance, which involves the Thalamus and Cerebrum in their entity only in the very highest types. This is an important confirmation of the laws laid down by Flechsig and Meynert.

ASTRONOMY.

The Morrison Observatory.

The Morrison Observatory—the gift of Miss Morrison, a former resident of Glasgow—was built at Glasgow, Missouri, in 1875. The building is well adapted to the purpose it is intended to serve, and was cons ructed under the supervision of Prof. C. W. Pritchett, who consulted several of the leading astronomers of the country in preparing his plans.

The position of the observatory is, latitude, 39° 16′ 16.8″ north. Longitude $1^h\ 3^m\ 5.93^s$ west of Washington. The latitude was obtained from observations recently made with the Transit Circle, and discussed by Prof. H.S. Pritchett; the longitude from an exchange of signals made with the United States Naval Observatory in 1880.

For instrumental equipment, the Morrison Observatory possesses one of Clark's finest 12¼ equatorials. It is of 17 feet focal length, and has already been the means of discovering a number of faint double stars. In 1877 and again in 1879, a large number of observations of the satellites of Mars were obtained. *Mimas* has been ob-

served on at least three occasions, and has been suspected, without being positively identified, a much larger number of times.

The Transit Circle was made by Troughton and Simms, London, in 1876 and was mounted in 1877. The construction of the instrument and the method of mounting are quite similar to the instruments in use at Greenwich, and Harvard College Observaory.

The telescope has a clear aperture of 6 inches, and a focal length of 6 feet 4 inches. The axis is cast in a single piece, into which fit the steel pivots, 3.50 inches in diameter. The Y's are of gun metal, and their bearing surfaces 2.50 inches long, 0.74 inches wide. The piers are of iron, and are firmly bolted to heavy stone caps which rest upon brick foundations. The circles are 24 inches in diameter, divided to 5′, and read by four microscopes each.

The reticule in the focus of the telescope carries 15 vertical and 5 horizontal threads—the vertical threads being all carried by the Right Ascension micrometer screw, and the horizontal threads by the declination screw. There are no fixed threads in the field.

The Transit Circle is furnished with two collimators having object glasses of 4 ft. 3 in. focal length and 4.33 in. aperture. The distance between the bearing points of the collimator Y's is 3 ft. 10 in. In the focus of each collimator are fixed two close vertical threads (about 5.3″ apart) and one horizontal thread. In the ordinary time observations it is customary to observe for collimation immediately before the observations of star transits, and then set the micrometer so as to destroy the error in collimation.

The Standard Sidereal Clock of the Observatory is Frodsham No. 1369. It was mounted in 1877, and has been running for two years past on a very small and constant rate.

In addition to these instruments, the Observatory is furnished with an excellent 4-in. Clark Comet Seeker, an Altazimuth by Gasella, and the usual barometers, thermometers, etc.

The work now being carried on is chiefly equatorial, and may be divided into two parts, as follows:

1. Double Star Work. A list consisting chiefly of binaries which have been neglected for some years (some of them for ten or twenty, or even thirty years) and will well repay observation. Besides these, a selected list of Burnham's stars, which are suspected of binarity, or which are quite new and have not been observed. Most of these stars are in the southern sky, and including the list for personal equation, will make a total of about 500 doubles. This work is well under way and will probably be concluded within a year.

2. The second part of the equatorial work consists of observations, descriptive and micrometric, upon planets and their satellites, and includes a series of observations extending over several years, upon the satellites of Saturn, and observations upon the red spot of Jupiter since its discovery at Glasgow in 1878.

With the Meridian Circle, no work is done beyond the ordinary observations for time.

The Time-Service of the Observatory, inaugurated within the past year by Prof. H. S. Pritchett, has met with well deserved success, and its value is fully appreciated by the people of the State, Two time balls are dropped by the Observatory clock—one in St. Louis and one in Kansas City—and the clock signals are regularly distributed over a large and constantly increasing area. Owing to its position—almost exactly one hour west of Washington—the Morrison Observatory will doubtless be largely depended upon in regulating the time of the Mississippi Valley, if any of the schemes for "Uniform Time" which have recently been proposed are ever adopted.

Though so well equipped instrumentally, Morrison Observatory, like many a similar institution of longer standing, is sadly crippled for want of funds: its income being barely sufficient for the support of a director without assistance. It is greatly to be regretted that one of the most promising observatories in the country should be thus curtailed in its usefulness, merely for want of proper financial support. W. C. W.

DISCOVERY OF AN ASTEROID.

The Smithsonian Institution has received from M. Foerster, of Berlin, the announcement of the discovery by M. Palisa, at Pola, on the 20th of May, 1881, of a planetoid of the thirteenth magnitude, in

R. A. 15h 3m
Dec. —23° 2′

with a daily motion of 8m *north*.

CORRESPONDENCE.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.*]

LOCUSTS AND SUN SPOTS.

To the Editor of "SCIENCE:"

SIR: It may concern some of your readers to know that I have just made the interesting discovery, that the multiplication and migration of the Rocky Mountain Locust (*Caloptenus spretus*), has been hitherto in exact agreement with the minima of Wolf's sun spot cycles as given (Mem. As. Soc. vols. XLII and XLIII), and its decrease has as nearly accorded with the maxima, there not being a year's difference. On European areas, it may be remarked, insect migration but *rarely agrees* with these maxima and minima, the chief periods being obtainable by counting the elevens since 1846. There likewise exists this marked difference, in that while the American locust spreads to the east and west of south, European migrants come north and east.

It would be important to determine the multiplication of the Corn Weevils in relation to the sun spots. Cannot the trade keep diaries? As the more destructive kind comes from the tropic, the minimum period should be dreaded. A. H. SWINTON.

GUILDFORD, ENG., *May*, 1881.

THE VIEWS OF DR. HOLMES UPON THE PROPOSED REVISION MODIFICATIONS OF ANATOMICAL NOMENCLATURE.

We are permitted to publish the following letter from Oliver Wendell Holmes to Professor B. G. Wilder respecting the articles on "Anatomical Nomenclature" which appeared in Nos. 38 and 39 of this journal. It may not be generally known to our readers that "The Autocrat of the Breakfast-table" has been for many years the Professor of Anatomy in the Harvard Medical School. BOSTON, May 3, 1881.

Dear Dr. Wilder:

I have read carefully your papers on Nomenclature. I entirely approve of it as an *attempt*, an attempt which I hope will be partially successful, for no such sweeping change is, I think, ever adopted as a whole. But I am struck with the reasonableness of the system of changes you propose, and the fitness of many of the special terms you have suggested.

The last thing an old teacher wants is, as you know full well, a new set of terms for a familiar set of objects. It is hard instructing ancient canine individuals in new devices. It is hard teaching old professors new tricks. So my approbation of your attempt is a *sic vos non vobis* case so far as I am concerned. There is one term which I do not quite fancy, *pero*, which you couple with *pes* in naming the rhinencephalic lobe. I should prefer the old term *bulbus* with *theca* unless there is some objection I do not see.

What you have to do is to keep agitating the subject,